DOCUMENT RESUME

ED 347 782 FL 018 067

AUTHOR Huckin, Thomas H.; Jin, Zhendong
TITLE Inferring Word Meaning from Context: A Study in Second Language Acquisition.
PUB DATE Oct 86
NOTE 12p.; In: Proceedings of the Annual Eastern States Conference on Linguistics (3rd, Pittsburgh, PA, October 10-11, 1986). p271-280.
PUB TYPE Speeches/Conference Papers (150)

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS *Context Clues; *Decoding (Reading); English (Second Language); Graduate Students; Higher Education; *Inferences; Reading Skills; *Reading Strategies; *Second Language Learning; Vocabulary Development; Word Recognition
IDENTIFIERS Chinese Speaking

ABSTRACT

A study investigated the ability of native-Chinese-speaking graduate students (N=18) at Carnegie Mellon University and the University of Pittsburgh to infer word meanings from context in two passages written in English. One passage came from the "China Daily" and the other from an editorial in a student newspaper. Glosses were provided for the few non-target words, and 20 words in each passage were chosen for the study. All subjects were given the article from the "China Daily" and were asked to follow three steps: (1) to guess, in either English or Chinese, what the target word meant; (2) to translate the text into Chinese; and (3) to explain what strategies the student used to guess word meanings. Subjects were then divided into control and test groups. The test group was given 15 minutes of training in how to guess the meaning of unfamiliar words in context. The control group did not receive any training. Then, all subjects followed the same three steps with the other passage. The general observations resulting from the study are reported. (DJD)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED347782

Inferring Word Meaning From Context: A Study in Second Language Acquisition

by

Thomas H. Huckin and Zhendong Jin

from

Proceedings of the Third

EASTERN STATES CONFERENCE ON LINGUISTICS

The University of Pittsburgh

Pittsburgh, Pennsylvania

October 10-11, 1986

Fred Marshall
Editor
The University of Pittsburgh

Ann Miller
Associate Editor
The Ohio State University

Zheng-sheng Zhang
Associate Editor
The Ohio State University

FL018067

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☑ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY

Joseph. B D

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

BEST COPY AVAILABLE

INFERRING WORD-MEANING FROM CONTEXT: A STUDY IN SECOND LANGUAGE ACQUISITION

Thomas N. Huckin
Zhendong Jin
Carnegie Mellon University*

Vocabulary knowledge is unquestionably of major importance in second-language acquisition and second-language performance. This fact is implicitly acknowledged in standardized language proficiency tests, which always contain major sections on vocabulary; in the standard practices of commercial language schools, which give primary emphasis to vocabulary learning; and in opinion surveys given to second- language learners, which invariably point to a deficient vocabulary as a major problem in using the second language. Yet the amount of attention given to the subject by ESL teachers and textbooks is relatively small. There are no doubt many reasons for this neglect, including the logistical one that teaching vocabulary in the usual way (i.e. item-by-item) is a slower and less productive activity than is teaching grammar, pronunciation, or other more rule-governed aspects of language. But it also results, we believe, from a lack of understanding of how new words can most efficiently be learned. Until a great deal more fundamental research is carried out, such as is being done with first-language learners, ESL teachers and other second-language teachers will probably continue to use less than optimal methods in teaching vocabulary.

There are three ways to learn new words: direct instruction, dictionary lookups, and inferring word-meanings from contextual clues. The first of these, direct instruction, is perhaps the most efficient way of learning any one particular word, and should not be abandoned. But it is quite inefficient for learning large numbers of words. New words and expressions, especially the idiomatic kind that are so important to second-language fluency, must usually be learned on an item-by-item basis, and teachers are understandably reluctant to devote class time, including the necessary review-and-practice, to such time-consuming activity. The dictionary method allows teachers and learners to carry out two activities -- vocabulary learning and reading -- simultaneously, but in other respects it is very inefficient. Looking up words in a dictionary disrupts the normal reading process, and words in context can have different meanings from their dictionary definitions -- especially if, as sometimes happens, the learner inadvertently selects the wrong definition.

We wish to argue that the third method, inferring word-meanings from context, is a very valuable adjunct to the direct method. First, it allows learners to practice both vocabulary learning and reading at the same time, and is thus an efficient use of learning time. Second, by linking these two activities, it helps learners see that one skill complements the other. Research shows that having a large vocabulary helps make one a better reader, and being a good reader helps one develop a large vocabulary (Davis, 1944, 1968; Sternberg and Powell, 1983; Just and Carpenter, 1987). If students can be made to understand the symbiotic relationship between vocabulary learning and reading, it will encourage them to invest more time and effort working on these two skills. Third, inferring word-meanings while reading allows learners to experience these words in natural contexts. Contextualization is known to be a powerful learning tool and memory aid, so experiencing words in context should enable students to both learn and

remember them better than words studied out of context. Fourth, inferring word-meanings through reading promotes the kind of incremental learning that is typical of first-language acquisition (Nagy, Herman, and Anderson, 1985). Words take on different shades of meaning in different contexts and thus should be *experienced* in different contexts.

Many ESL textbooks on reading contain sections encouraging students to guess the meanings of unknown words from context, but few of them offer direct, explicit instruction in how to do so. And among those few, almost none focus attention on any context larger than that of the sentence containing the target word and perhaps an adjacent sentence. These shortcomings are due, we believe, to a longstanding shortage of research on the subject. The work that we report on here is an attempt to address these problems. Specifically, we wanted to see if advanced intermediate learners of English need instruction in guessing word meanings from context, and, if so, where they most need it. In an earlier, exploratory study (Huckin 1986), we found that lower intermediate students in Brazil did not infer word-meanings from context, because they did not know how to. They were simply unaware of the discourse-based principles involved, such as identifying and using rhetorical patterns, genre conventions, syntactic parallelism, embedded definitions, and paraphrasing. Instead, they relied heavily on the fact that Portuguese and English share many cognate forms. In cases where the unknown English word had no recognizable cognate in Portuguese, or represented a false cognate, these lower-intermediate students were generally unable to deal with it.

The present study was designed with four purposes in mind. First, we wanted to see if more advanced students had similar problems with guessing word meanings from context. Second, we wanted to use students whose native language is unrelated to English, so as to minimize the influence of cognates. Third, we wanted to see if the discourse principles involved in guessing could be easily learned and put to use. And finally, we wanted to do a controlled, hypothesis-testing study, not just an exploratory one.

METHOD

Subjects.

For subjects we used 18 Chinese graduate students enrolled at Carnegie-Mellon University or the University of Pittsburgh. Most were studying in technical areas; all but four of them had been in the United States for less than a year. Most had taken various English proficiency texts prior to or shortly after coming to the United States, and we had most of these scores. But since these scores did not reflect the subject's <u>current</u> proficiency in English, we decided to administer a screening test of our own, designed to estimate the size of their English recognition vocabulary. We developed a multiple-choice test of 40 items taken from the Brown Corpus of American English (Francis and Kucera, 1982), consisting of the 20 least frequent words in the 4000-5000 range and the 20 least frequent words in the 5000-6000 word range. (An incidental purpose of this selection was to see if performance on one set would predict performance on the other. As it turns out, it did so for the group as a whole --15.7 to 14.1-- but not reliably for individuals.) Our subjects averaged 29.8 correct answers out of 40, with a range of 21 to 33; random guessing would have produced an average score of only 13.

Materials.

We then selected two texts. One, taken from the China Daily (see next page), is a 326-word article about a plan to produce a new type of steam locomotive in China. The other, taken from the The Pitt News, the local campus newspaper, is a 308-word editorial about student drinking. Text comprehension studies can easily be contaminated by improper text-selection, so we chose these two with great care. Specifically, we wanted texts that (1) would allow the subjects to draw significantly on prior knowledge, (2) would deal with interesting, contemporary topics, (3) would have few unfamiliar words, and (4) would allow the meaning of those unfamiliar words to be guessed from contextual clues. In short, we wanted to simulate as best we could the kind of reading conditions that would normally attract our subjects and expose them to new vocabulary. Both of these texts satisfied these criteria. The second author, who was an active member of the Chinese student community from which our subjects came, determined that the texts dealt with familiar, interesting topics in familiar modes (many of the subjects even read these two newspapers from time to time) and that they had few unusual words other than the target words. We provided glosses of the few non-target words that might not be known by the subjects and made sure, during the testing, that subjects were not affected by unknown non-target words. Both of us agreed that the meaning of all 20 target words could be inferred from context.

Procedure.

Throughout the entire experiment, we worked with each subject individually and intensively for one hour at a time. All sessions were tape recorded.

Phase 1. All subjects were given Text A (the China Daily article) and asked to tell, in either English or Chinese, what he thought each underlined word meant. No time constraints were set, and subjects were told that, if they wanted to, they could read the text before doing the task. Next, the subject was asked to translate the entire text into Chinese. This step was designed to make sure that all subjects knew all of the non-target words, and to see if forcing them to attend to the text as a whole would change their interpretation of the individual words. Finally, the subject was taken through a post hoc analysis, in which he was asked to explain what strategy he had used to try to guess the meaning of the target words.

After all 18 subjects had completed Phase 1, we evaluated their guesses and gave them zero, one-half, or one full point for each one. We then totalled each subject's scores and, on the basis of these scores, divided the 18 subjects into two matched groups, each group having made about 55% correct guesses (see Table 1).

	Control group	Test group
Number of subjects	9	9
Mean number of guesses on Text A	5.4	5.1
Mean number of correct guesses	3.0	2.8
Mean % correct guesses	55.1	55.4
Standard deviation	17.0	16.6
Mean Francis-Kucera score (x /40)	29.6	30.1

Table 1. Group Characteristics after Phase 1

NJ manufacturer sets steam locomotive deal

by our correspondent
Kathlean Connors

NEW YORK — American Coal Enterprise (ACE) of Lebanon, New Jersey, has announced the signing of a memorandum of agreement with China's Ministry of Railways to produce steam locomotives at the Datong Locomotive Works in Shanxi Province.

Under the proposed partnership, the Datong Locomotive Works would use the most advanced coal-combustion technology supplied by ACE to produce highly efficient, coal-fired steam engines for locomotives.

These engines would take advantage of China's vast coal deposits as an energy source. China has the largest coal reserves in the world, estimated at 640 billion tons.

The new engines, called the ACE 3000, would enable China to reverse the trend toward use of diesel locomotive engines, freeing more of China's oil resources for other projects.

China is the only country that still produces first generation coal-fired locomotives. Because the factories are already in production, locomotives can be produced in China more quickly and more economically than in the US.

"I was very impressed by the quality of the workmanship in the Datong Locomotive Works," said Ross E Rowland, Jr, chairman and chief executive officer of ACE, returning from his first trip to China.

Rowland is no stranger to the railroad business. A self-made millionaire who amassed a fortune in commodity futures, he is one of the leading developers of railroad projects in the US.

Rowland founded ACE in 1980 to develop a new generation of environmentally-sound steam locomotive engines. Within a month the company will be sending a team of engineers to Datong. If all goes well, Rowland says, he expects the first ACE 3000 to be produced as early as 1987.

The factory is expected to retrofit four engines a week.

New technology has helped reduce pollution from the locomotives by up to 90 per cent.

The Datong Locomotive Works will be in an excellent position to earn foreign exchange, said Rowland, because China will be the world's only producer of high technology, environmentally clean, coal-burning engines.

Text A. [Source: China Daily (Business Weekly), No. 37, 3/5/86]

Phase 2. Using Text A for illustrations, we gave the test group 15 minutes of training in how to guess the meaning of unfamiliar words from context. Following is a capsule summary of this training:

NJ -- Is clearly an abbreviation, probably of a proper name. Newspaper headlines are conventionally repeated or paraphrased in the lead sentence of the article itself, so *NJ* should be repeated in full form in the lead sentence. *New Jersey* is the obvious candidate, and its occurrence in the subject position of the lead sentence, parallel to *NJ's* occurrence in the subject position of the headline, provides additional evidence.

deal -- As part of the headline, this word should also be repeated or paraphrased in the lead sentence. Grammatical parallelism here too helps the reader see that *deal* must mean some kind of *agreement.*

memorandum -- Since it occurs in the phrase, *signing of a* _____ , it must be some kind of a document. And the word-stem *memor-* ("remember") should be recognizable from the word *memory,* well known to these Chinese students. Hence, *memorandum* would be "a document to remember something by."

partnership -- The definite article and the word *proposed* preceding this word indicate that *partnership* refers to the main idea of the preceding sentence, namely, that America and China will work together to produce steam locomotives. Morphological analysis supports this hypothesis. These students knew the word *partner* as "someone you work with." The suffix *-ship* makes it more abstract: roughly, "working together as partners."

combustion -- Its link to *coal* is the strongest clue to guessing its meaning, enabling the reader to spot parallel expressions elsewhere in the text. Later in the sentence we find *coal-fired* and at the end of the article we find *coal-burning*. So *combustion* most likely means "burning" or "firing."

vast -- Here too grammatical parallelism helps out: *vast coal deposits* is paralleled in the following sentence by *largest coal reserves*. So *vast* would mean "very large."

reserves -- Because of the parallelism just described, this word probably means "deposits."

reverse -- This word occurs in the phrase, *reverse the trend toward use of diesel locomotive engines*. A trend, as these students knew, can have only one direction. If the current trend is toward diesel locomotive engines but the future one will be toward steam locomotive engines, then *reverse* must mean something like "change direction."

amassed -- This word appears in the subordinate phrase, *A self- made millionaire who amassed a fortune in commodity futures*. Subordinate phrases usually contain a single major idea (or make a single "point"). In this case, the major idea -- signalled by the indefiniteness of the head noun phrase -- is that Rowland is a "self-made millionaire," i.e., someone who made millions of dollars on his own. The relative clause should simply expand on that idea, not introduce a new one. Thus, it is probable that the relative clause part of the phrase merely states how he made his millions, not what he did with them afterwards. *Amassed* means "made" or "accumulated," not "invested."

sound -- Since it is modified by an adverb (*environmentally-*), this word cannot be a noun and thus cannot mean "noise." A clue to its meaning resides in the parallel expression *environmentally-clean* that appears at the end of the article.

Also, in the next-to- last paragraph there is discussion of how the new technology has helped reduce pollution. These contextual clues, coupled with the fact that references to environmental matters in today's world usually refer to pollution, suggest strongly that *sound*, in this context, means "clean."

retrofit -- This word occurs in the sentence, *The factory is expected to retrofit four engines a week.* Since factories typically produce things and since the article as whole is talking about production, a reasonable guess would be that *retrofit* means "produce." But that is only part of its meaning. As is implied in the rest of the article, especially paragraph 5, these new engines will be installed in earlier model locomotives. Hence, *retrofit* here means basically, "build and install into older-style locomotives."

The control group did not receive any of this training. We then gave all 18 subjects Text B (see next page) and took each of them through the same three-step procedure we had used for Phase 1.

Results.

The results of this second phase of testing were that the control group had 72.8% correct guesses while the test group had 86%, a significant difference ($p < .05$, one- tailed matched t-test). Standard deviations were 15.3 and 12.3, respectively. On the basis of this evidence, we claim that even a small amount of instruction can cause a noticeable improvement in the ability of non-native speakers to infer the meanings of unknown words through context.

Our instruction included analysis of Text A and general heuristics. It was not directed at all to specific types of contextual clues found in Text B. Yet the group that received this instruction did significantly better on this second text. So these subjects were clearly able to use the general heuristics. It is interesting to note exactly where they seem to have benefited most from the instruction. Three words in particular show a marked differential in scores between the two groups: *stepped up, deter,* and *cater to*. 55% of the control group subjects had trouble with these words, while only an average 22% of the test group did. Where subjects typically went wrong in these cases was to guess what meaning might fit only in the immediate context, without regard for the larger rhetorical patterns of the text. For example, *stepped up* was often misinterpreted as "started" rather than "increased." While "started" could co-occur with "their patrols" in other contexts, here it would be at odds with "tightened" in the second part of the sentence. Attention to the syntactic and semantic parallelism of these two verbs, and to the connective phrase *in turn* linking them, plus a willingness to "look ahead," would have led them to the right meaning. Likewise, some subjects in the control group misinterpreted *deter* as "punish" rather than "stop" or "discourage." In other contexts one could imagine laws being used to "punish" drinkers, but here -- even with the word *penalty* appearing earlier in the sentence -- such an interpretation is clearly inappropriate. The paragraph as a whole talks about stopping the drinkers, not punishing them. Attention to this larger context, guided by the connective *even*, should have prevented such a misinterpretation.

Main Findings.

With regard to the type of subject we studied (academically talented non-native speakers with advanced intermediate proficiency in English), we wish to make the following claims and observations:

Under 21

Despite efforts by state and local government agencies, underage drinking remains a problem in the Oakland area. The Pennsylvania Liquor Control Board has stepped up their patrols, and, in turn, the bars have tightened their own security. However, the problem remains. Underage drinkers have sidestepped the laws by falsifying their driver's licenses. Some of the methods are virtually impossible to detect and ultimately the bars shoulder the blame. The state has proposed new laws that would transfer the penalty from the bar owners to the offenders, but even those new laws will not deter underage drinkers.

There must be an alternate way of dealing with the problem. Perhaps if the underage drinkers were given an alternative to the bars, they would not frequent the establishments. Currently the underage students at Pitt have no such choice.. There is no place for these students to socialize or dance that does not serve liquor. Other universities offer nightclubs that cater to underage students.

However, this solution may not be workable at the University of Pittsburgh. With the numerous bars in the area, perhaps the best way to curb the underage drinking problem — and still provide those students with a place to relax — would be to have some bars allow underagers into their establishments. They could stamp the hands of those people and, subsequently, they would not be served by the bartender. Of course, there are problems with this plan. Many bartenders may be too busy to check for the stamps, and the underage drinkers will get served. However, many under-21 students just want to go to bars to socialize. They might not even want to drink, but they should be allowed to participate in Oakland's social life. No one can stop young people from drinking, but perhaps if more alternatives were available the desire for liquor would be lessened.

Text B. [Source: The Pitt News, 4/7/86]

1. Even brief instruction in the heuristics of inferring word-meanings from context is effective.
2. Almost half of the target words in our first test were already familiar to most of our subjects and thus did not require guessing. The best predictor of prior familiarity seemed to be whether or not the word is included in standard English language teaching materials in the home country. For example, *vast* and *reverse* were the only target words in our experiment that were already familiar to virtually all of our subjects; they were also the only target words included in the Chinese 5000, a listing of 5000 common English words that is used as the basis for vocabulary instruction in Chinese secondary schools and universities.
3. The second best predictor of prior familiarity seemed to be the frequency with which the word appears in writing in the student's current local environment. For example, *NJ* and *memorandum* were already known by many of our subjects because they had seen them in local notices, newspapers, or other written forms. These words are not included in the Chinese 5000 and only *memorandum* appears in the first 6000 words of the Francis-Kucera frequency list (it is listed as occurring only 4 times in one million words).
4. The frequency with which a word appears in general American written English, as measured for example in the Francis-Kucera survey, does not appear to be a reliable predictor of whether or not a student is likely to be familiar with it. For instance, *sound* is a high-frequency adjective, ranking 2184th on the Francis-Kucera list, yet only three of our 18 subjects had ever seen it. *Stamp* occurs twice as often in the Francis-Kucera list as a verb than as a noun, yet our subjects knew it only as a noun. Not surprisingly, our screening test based on the Francis- Kucera survey did not accurately predict performance in our experiment.
5. The primary factor governing the guessability of a word in our experiment seemed to be how closely the word related to the major topic or theme of the text, as Sternberg and Powell (1983) found for native speakers. Our subjects were able to easily guess unfamiliar, low-frequency words like *underager* and *curb* because these words played prominent roles in the text and had many contextual clues. Guessability also seemed to be governed by the collocability of a word, that is, by its perceived connection to neighboring words that are well known. *Memorandum*, for example, could be guessed because of the word *signing* preceding it; *amassed* could be guessed because it was clearly linked to *millionaire* and *fortune*. A few students mistook the latter for "good luck"; as soon as we told them its correct meaning, they were able to quickly guess the meaning of *amassed*.
6. Students at this level easily manage lexicogrammatical category shifts, provided there are enough contextual clues to support the reinterpretation. The word *shoulder*, for example, was familiar to all of our subjects as a noun, but only two had ever seen it used as a verb. Yet 13 out of the 16 were able to guess its meaning, probably because of its proximity to *blame*. They were all aware of the collocation, *take the blame*, so it was easy for them to interpret the verb *shoulder* as "take." Most of the other words of this type, such as *stamp* and *frequent*, were also guessed by a large majority of our subjects. The only significant exception was *sound*, which did not benefit from as many clues in the immediate context.
7. Students at this level, unless they are specifically trained to, do not use discourse parallelism very well. *Sound*, *stepped up*, and *combustion* can all be guessed from parallel synonyms, but few of our subjects took advantage of this. They also do not take full advantage of connectives. As discussed above, *deter* and *stepped up* should have been fairly easy to guess, given the connectives *even* and *in turn* that are used with them. Yet many of our subjects failed to guess their

meaning.

8. Students at this level do use contextual clues effectively to guess word-meanings, but they do not use such clues very thoroughly. Instead, they seem satisfied with being partly correct. For example, almost all of our subjects translated *retrofit* as "produce." Though this is partly correct, it does not capture the idea, implicit in the text, that the new engines will be installed in older-model locomotives.

CONCLUSION

To address some of the questions raised earlier, we feel that second language learners at relatively advanced levels, unlike those at lower levels perhaps, are quite able to use contextual clues to guess word-meanings while reading. However, they do not seem to make maximal use of these clues, in particular those clues belonging to the larger textual context. Therefore, second-language teachers should provide instruction in the various kinds of discourse patterns involved. In so doing, they will be helping their students not only with vocabulary acquisition but with reading comprehension as well.

There are at least two reasons, however, why some second-language teachers may resist such a recommendation. As is so often the case, they are not linguistic reasons but cultural ones. First of all, in some countries (China being one of them), trying to guess the meaning of a word when one can learn its so-called precise meaning from a dictionary is disapproved of. It is considered academically sloppy and not in keeping with the Confucian ethic. Of course this viewpoint can be challenged on a number of linguistic and psychological grounds, but if one is teaching in such a country, one would be wise not to challenge longstanding cultural traditions too directly. We found, incidentally, that the Chinese students we used in our research here, contrary to this cultural tradition, were not particularly inhibited about guessing word-meanings. (Of course in this case they had two authority-figures telling them to do so!)

Secondly, in our own culture (and in many others as well, again including China), we value testing as an important part of the educational process. Direct teaching of vocabulary lends itself to easy testing, and this may be why it is the most common method of teaching vocabulary in second-language classrooms. By contrast, the incidental approach to learning vocabulary through reading does not lend itself easily to testing. Tests can be devised, based on principles of selection like those we used in our research, but this is much more difficult than simply picking a set of isolated words from a frequency list. Furthermore, the learning that is fostered under this approach is based on widely-distributed, varied exposure to different features of a word; it is not based on massed practice and repetitive reinforcement. Thus, contextual learning is a special kind of *incremental* process which occurs gradually over time and which cannot be easily measured. An ESL teacher who devotes time to teaching discourse principles may not be able to see direct results. To avoid being discouraged by this, he or she should keep in mind that -- judging from research in first- language contexts (there being almost none in second-language ones) -- incremental learning can produce an enormous increase in vocabulary knowledge over time. Since this is measurable only in a gross way, not in an itemized way, perhaps we should consider adopting new ways of testing vocabulary acquisition.

The learning of vocabulary is a basic and fundamentally important part of second language acquisition. In a recent study reported in TESOL Quarterly, Muriel Saville-Troike found that vocabulary knowledge was the single most important factor in academic success in a second language. We feel that second-language educators should therefore devote more attention, both in research and in teaching, to vocabulary learning and acquisition. In particular, they should try to gain a better understanding of how language learners can be taught to use *a variety of* contextual clues, not just local ones, in inferring word-meanings.

FOOTNOTE

*This research was supported by the Resource Allocation Board of Carnegie Mellon University, through funds to the ESL Center, and by the second author's home institution, Northern Jiaotang University (Beijing), through a paid leave-of-absence.

REFERENCES

Davis, F.B. 1944. Fundamental factors in reading. Psychometrika, 9, 185-197.

Davis, F.B. 1968. Research in comprehension in reading. Reading Research Quarterly, 3, 499-545.

Francis, N. and H. Kucera. 1982. Frequency Analysis of English Usage. New York: Houghton-Mifflin.

Huckin, Thomas. 1986. The use of discourse patterning in foreign language reading and vocabulary acquisition. DELTA, 2:1, 57-76.

Just, M. and Carpenter, P. (1987). The Psychology of Reading and Language Comprehension. Boston: Allyn and Bacon.

Nagy, W., P. Herman, and R. Anderson. 1985. Learning words from context. Reading Research Quarterly, 20:2, 233-253.

Sternberg, R. and J. Powell. 1983. Comprehending verbal comprehension. American Psychologist, 38, 878-893.